Claims

1. Macromolecular photocrosslinkers having a general formula

$(A)_n(B)_m(C)_p$, wherein

(i) A, B and C are units of substituted ethylene or siloxane groups in the macromolecular structure;

(ii) C carries a photoactive groups;

(iii) n = 0-98 mole %, m = 0-98 mole %, n+m = 50-98 mole % and p = 0.5-50 mole %;

and when said photoactive groups are exposed to light of determined wavelengths above 305 nm, radicals are generated and retained on the macromolecular photocrosslinkers and reacting so as to accomplish a crosslinked network structure.

2. Photocrosslinkers according to claim 1 characterized in that said photoactive group comprises a phosphine oxide.

3. Photocrosslinkers according to claim 2 characterized in that the photoactive group is an acyl- or aroyl phosphine oxide.

4. Photocrosslinkers according to claim 3 characterized in that the photoactive group is linked to the ethylene groups of units C by a linking group comprising a phenylene group, said phenylene group being optionally substituted.

5. Photocrosslinkers according to claim 1, wherein the ethylene units A, B, C of the macromolecular structure comprises substituents in accordance with:

$A= -CH_2-C(R^1R^2)-$, $B= -CH_2-C(R^1R^3)-$, $C= -CH_2-C(R^1R^4)-$, wherein

R^1 is hydrogen or methyl;

R^2 is $-CON(Me)_2$, $-CO_2CH_2CH_2OH$, $-OCOCH_3$, $-OCOCH_2CH_2Ph$, -OH or a lactam group;

R^3 is $-CON(Me)_2$, $-CO_2CH_2CH_2OH$, $-OCOCH_3$, $-OCOCH_2CH_2Ph$, -OH or a lactam group when B is $-CH_2-C(R^1R^3)-$ with the proviso that R^2 and R^3 are not the same unless R^2 and R^3 is -OH; and

R^4 is $-R^5C(O)P(O)R^6R^7$ or $-R^5P(O)R^6OC(O)R^7$, wherein R^5, R^6 and R^7 are selected among same or different aryl groups comprising phenyl, methylphenyl, dimethylphenyl, trimethylphenyl, methoxyphenyl, dimethoxyphenyl, trimethoxyphenyl, methylolphenyl, dimethylolphenyl, trimethylolphenyl or styryl radicals.

6. Photocrosslinkers according to claim 5, wherein R^2 and R^3 are selected so as to form a water-soluble molecule.

7. Photocrosslinkers according to claim 5, wherein said lactam units together with units A or B constitute N-vinylpyrrolidone units.

8. Photocrosslinkers according to claim 5, wherein at least one of R^2 and R^3 is hydroxyl.

9. Photocrosslinkers according to claim 5, wherein A is N-vinylpyrrolidone, B is vinyl alcohol.

10. Photocrosslinkers according to claim 1 ~~or 5~~ provided with functional groups for crosslinking.

11. Photocrosslinkers according to claim 10 provided with functional groups selected among vinylic, acrylic and methacrylic groups.

12. Photocrosslinkers according to claim 1 characterized in that units A, B and C are

siloxane monomer units of a general formula $-R_aR_bSiO-$, wherein R_a and R_b in units A and B are selected among lower substituted or unsubstituted alkyl groups, aryl groups and arylalkyl groups.

13. Photocrosslinkers according to claim 12, wherein at least on of R_a and R_b is an aryl or arylalkylgroup.

14. Photocrosslinkers according to claim 13, wherein at least one of R_a and R_b is substituted with one or more fluorine atoms.

15. Photocrosslinkers according to claim 1, wherein units A, B, C are siloxane units comprising substituents in accordance with:

A is $-Si(R^1R^2)-O-$, B is $-Si(R^1R^3)-O-$ and C is $-Si(R^1R^4)-O-$, wherein

R^1 is C1 to C6 alkyl; R^2 is C1 to C6 alkyl or phenyl; R^3 is R^1, R^2 or C1 to C6 fluroalkyl;

R^4 is $-R^5R^6C(O)P(O)R^7R^8$ or $-R^5R^6P(O)R^7OC(O)R^8$, wherein R^5 is a spacing group; R^6, R^7 and R^8 are selected among same or different aryl groups comprising phenyl, methylphenyl, dimethylphenyl, trimethylphenyl, methoxyphenyl, dimethoxyphenyl, trimethoxyphenyl, methylolphenyl, dimethylolphenyl, trimethylolphenyl or styryl radicals.

16. Photocrosslinkers according to claim 15, wherein R^5 is aliphatic spacing group comprising between one and ten atoms.

17. Photocrosslinker according to claim 16, wherein said spacing group is $(-CH_2)_n$, wherein n is between 1 and 10.

18. Photocrosslinkers according to claim 15, wherein R^1 is methyl; R^2 is methyl or phenyl; R^3 is R^1, R^2 or $-CH_2CH_2CF_3$.

19. Photocrosslinkers according to claim 15 having functional acrylic groups in its terminal ends.

20. A method of forming a macromolecular crosslinked network from a composition comprising a photocrosslinker according to any of claims 1 ~~to 19~~ by irradiating said composition with light exceeding a wavelength of about 305 nm for a time sufficient to form a solid article.

21. A method of forming a macromolecular crosslinked network from a composition comprising a photocrosslinker according to any of claims 1 ~~to 11~~ and at least one copolymerizable vinylic, acrylic or methacrylic monomer.

22. A method according to claim 20, wherein said composition further comprises a polymer provided with functional vinylic, acrylic or methacrylic groups.

23. A method according to claim 22, wherein said polymer has a backbone of ethylene units.

24. A method according to claim 22, wherein said polymer is a polysiloxane.

25. A method according to any of claims 20 ~~to 24~~, wherein an ophthalmic lens is produced.

26. A method according to claim 25, wherein an intraocular lens is produced in the capsular bag of the eye.

27. An ophthalmically acceptable composition comprising photocrosslinkers according to any of claims 1 ~~to 19.~~ having a refractive index greater than about 1.39 and a viscosity such that said composition can be injected through standard cannula having a needle of 15 Gauge, or finer.

28. The use of photocrosslinkers according to any of claims 1 to 19 in an ophthalmologically acceptable composition for injection into the capsular bag of the eye.